

WHAT IS CLAIMED IS:

1. A semiconductor laser device, comprising:
a semiconductor laser chip emitting a laser light;
a tracking beam generating diffraction grating for diffracting said
laser light to generate a tracking beam;
5 a signal light diffraction grating for diffracting a signal light being
said laser light reflected from an optical disc; and
a light receiving portion having a pair of focus error detecting
photodiodes, extending as two strips with a parting portion as a zonal gap
interposed therebetween, for receiving a focus error detecting beam among a
10 plurality of beams diffracted by said signal light diffraction grating;
said light receiving portion being arranged such that, as seen in two
dimensions, a longitudinal direction of said light receiving portion is
orthogonal to a direction of diffraction grooves of said signal light diffraction
grating, and
15 said pair of focus error detecting photodiodes being arranged such
that a spot of said focus error detecting beam on said light receiving portion
moves, due to a temperature change, in a range essentially limited within a
region of said parting portion.

2. A semiconductor laser device, comprising:
a semiconductor laser chip emitting a laser light;
a tracking beam generating diffraction grating for diffracting said
laser light to generate a tracking beam;
5 a signal light diffraction grating for diffracting a signal light being
said laser light reflected from an optical disc, said signal light diffraction
grating including a first diffraction grating having diffraction grooves of a
pitch and a second diffraction grating having diffraction grooves of another
pitch that is smaller than the pitch of the diffraction grooves of the first
10 diffraction grating, the diffraction grooves of said first and second diffraction
gratings extending in a common direction, and said first and second
diffraction gratings being arranged adjacent to each other with a portion

00004190-112504
TOP SECRET 06146600

extending in a direction orthogonal to the common direction of the diffraction grooves interposed therebetween; and

15 a light receiving portion having a pair of focus error detecting photodiodes extending as two strips with a parting portion as a zonal gap interposed therebetween for receiving, among a plurality of beams diffracted by said signal light diffraction grating, a focus error detecting beam diffracted by said second diffraction grating, said light receiving portion
20 having a longitudinal direction arranged, as seen in two dimensions, orthogonal to the direction of the diffraction grooves of said signal light diffraction grating,

said parting portion being sloped, as seen in two dimensions, from the first diffraction grating side to the second diffraction grating side as a
25 distance from said signal line diffraction grating increases.

3. The semiconductor laser device according to claim 1, wherein said pair of focus error detecting photodiodes has an outer shape in two dimensions of a parallelogram having a long side parallel to a longitudinal direction of said parting portion and a short side parallel to the direction of
5 the diffraction grooves of said signal light diffraction grating.

4. The semiconductor laser device according to claim 2, wherein said pair of focus error detecting photodiodes has an outer shape in two dimensions of a parallelogram having a long side parallel to a longitudinal direction of said parting portion and a short side parallel to the direction of
5 the diffraction grooves of said signal light diffraction grating.

5. The semiconductor laser device according to claim 1, wherein said light receiving portion has another photodiode arranged such that, as seen in two dimensions, a longitudinal direction of said photodiode is orthogonal to the direction of the diffraction grooves of said signal light
5 diffraction grating.

6. The semiconductor laser device according to claim 2, wherein

said light receiving portion has another photodiode arranged such that, as seen in two dimensions, a longitudinal direction of said photodiode is orthogonal to the direction of the diffraction grooves of said signal light diffraction grating.

7. The semiconductor laser device according to claim 1, wherein the plurality of beams diffracted by said signal light diffraction grating includes a track signal detecting beam and said light receiving portion further includes a track signal detecting photodiode for receiving the track signal detecting beam, the track signal detecting photodiode having a longitudinal direction orthogonal to the direction of the diffraction grooves of said signal light diffraction grating as seen in two dimensions.

8. The semiconductor laser device according to claim 2, wherein the plurality of beams diffracted by said signal light diffraction grating includes a track signal detecting beam and said light receiving portion further includes a track signal detecting photodiode for receiving the track signal detecting beam, the track signal detecting photodiode having a longitudinal direction orthogonal to the direction of the diffraction grooves of said signal light diffraction grating as seen in two dimensions.

9. The semiconductor laser device according to claim 7, wherein the plurality of beams diffracted by said signal light diffraction grating further includes a regenerative signal detecting beam and said light receiving portion further includes a regenerative signal detecting photodiode for receiving the regenerative signal detecting beam, the regenerative signal detecting photodiode being a parallelogram, as seen in two dimensions, having a long side sloped in a same direction as a long side of said pair of focus error detecting photodiodes and a short side in parallel with the direction of the diffraction grooves of said signal light diffraction grating.

10. The semiconductor laser device according to claim 8, wherein plurality of beams diffracted by said signal light diffraction grating further

includes a regenerative signal detecting beam and said light receiving portion further includes a regenerative signal detecting photodiode for receiving the regenerative signal detecting beam, the regenerative signal detecting photodiode being a parallelogram, as seen in two dimensions, having a long side sloped in a same direction as a long side of said pair of focus error detecting photodiodes and a short side in parallel with the direction of the diffraction grooves of said signal light diffraction grating.

11. The semiconductor laser device according to claim 9, wherein said pair of focus error detecting photodiodes and said regenerative signal detecting photodiode include respective regions in which respective spots of said focus error detecting beam and said regenerative signal detecting beam move in a working temperature range.

12. The semiconductor laser device according to claim 10, wherein said pair of focus error detecting photodiodes and said regenerative signal detecting photodiode include respective regions in which respective spots of said focus error detecting beam and said regenerative signal detecting beam move in a working temperature range.

13. An optical pickup apparatus for optically reading information written on an optical disc using the semiconductor laser device according to claim 1.

14. An optical pickup apparatus for optically reading information written on an optical disc using the semiconductor laser device according to claim 2.